


QUESTION 1 (10 + 40 + 10 = 60 marks)

The following bill is from a company that services cars.


Bonola Automotives

SERVICE
13 Simms Road Greensbrough, Vic 3088 P • 03 9435 5134 F • 03 9435 0047

E • bonola@bigpond.net.au W • bonolaautomotives.com.au / repcoservice.com ABN • 61 105 408 179

Tax Invoice

Inv. No. **4,973**
Date **26/6/06**

Client Details

Fred Nurkle
80 Main Rd
Eltham 3095

Vehicle Details

Registration: NVW000 Odo: 113356
Make/Model: NISSAN PULSAR
Type: Sedan Year: 1996
Next Service: Log Book Service 120,000km
Due: 27/12/06 Kms: 123356

Account 370
Home 94399999
Work 99259999

Work Done

Change Air Filter, Complete 62 Point Safety And Preventive Inspection And Minor Adjustments When Require, Clutch, Brakes, Front Wheel Bearings, Hand Brake Etc. Check And Top Up All Fluid Levels. Add Windscreen Washer Additive And Tyre Black Tyres. Replace Wiper Blade Inserts. Replace Spark Plugs.

Raise Vehicle And Remove Wheels, Inspect Front Pads, Dismantle Calipers And Remove All Pads. Check Discs For Wear Run Out, Replace Disc Rotors, Reset Pistons And Fit New Pads. Assemble Calipers And Refit Road Wheels.

Services, Parts & Labour

Qty	Description	Unit Price	Total (Ex)	Tax	Total (Inc)
1	Log Book Service 110,000km	\$76.36	\$76.36	\$7.64 GST	\$84.00
1	Filter Element Air	\$13.43	\$13.43	\$1.34 GST	\$14.77
4	Spark Plug	\$4.05	\$16.20	\$1.62 GST	\$17.82
1	Disc Pad Replacement - Front	\$76.36	\$76.36	\$7.64 GST	\$84.00
1	Brake Pads	\$65.45	\$65.45	\$6.55 GST	\$72.00
2	Rotor - Disc Brake	\$70.90	\$141.80	\$14.18 GST	\$155.98

Vehicle Report

Requires Cooling System Flush.
Rear Shock Absorber Dust Covers Split.

Reward Statement

Points to Date	168
Points added/redeemed	336
Total Points	504

Financial Summary

Total (Ex. Tax)	\$389.60	Terms	Cash
Tax Total	\$38.97	Paid	\$0.00
Rounding	-\$0.02		
Total (Inc. Tax)	\$428.55	Balance	\$428.55

Happy With The Service, Please Tell A Friend

TERMS AND CONDITIONS OF TRADE

1. Any account not paid within the time specified on the invoice or for more than sixty (60) days will be liable to meet in full the seller's debt recovery, legal costs and/or commission and internal accounting charges (recovery fee) and such recovery fees will be added to the buyer's account and form part of the principle debt. 2. Title to any goods purchased does not pass until full payment in full of the account to which the goods relate. 3. Limited warranty will apply to reclaimed parts or parts not supplied by seller. Warranty limitations may also apply to non standard applications. 4. Acceptance of our goods, services or quotation is automatic acceptance of these Terms and Conditions.

They accept bookings from customers who arrive at their building.

Customers normally book their car in for a regular service, which includes an oil change, filter replacements, spark plugs etc.

Sometimes the service will also include other features, depending on the instructions written in the car's service book.

On inspection the service person may find faults in the car. In this case they are required to get confirmation from the customer as to whether they should proceed with repairs. This is usually done by phone.

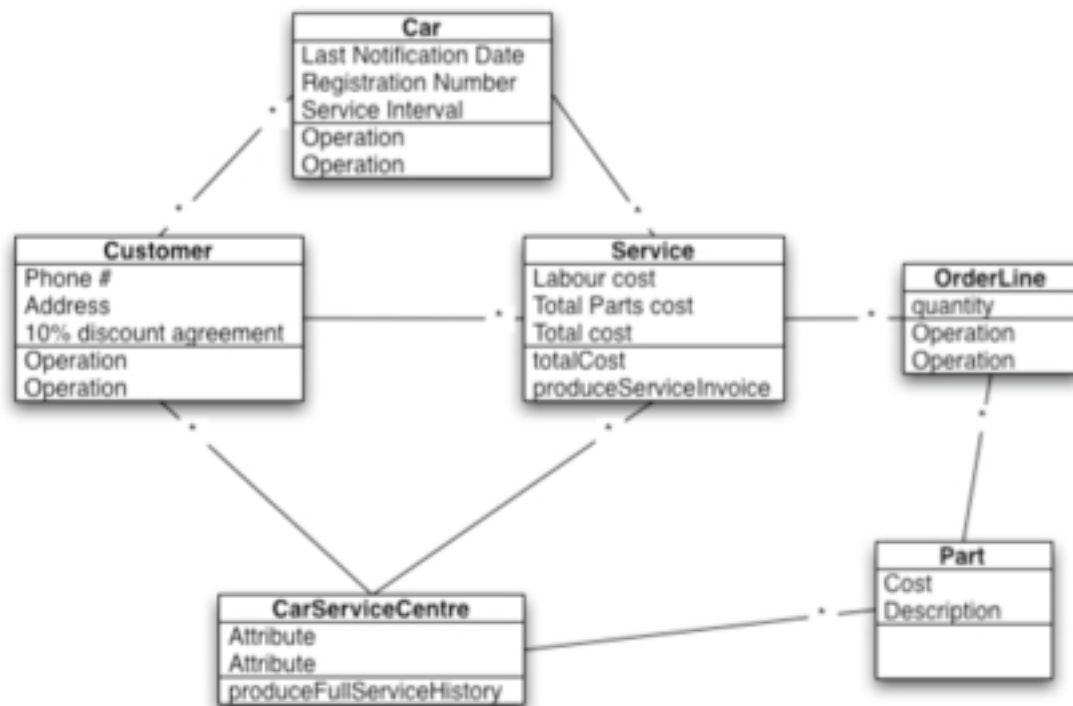
At the end of each service the customer is given an itemised invoice which lists all the costs incurred including parts and labour. The company keeps this information permanently so that when the customer decides to sell their car they can request a list of all previous services which would include the parts used and their cost, a description of the work done, and the total cost.

Most car owners are notified every 3 months that the next service is due. However some car types do not require servicing as often. Those car owners are notified after a time dependent on their type of car.

a) Draw a use case diagram.

See marking sheet for solution

b) Draw a class diagram that models the information found on this bill, and for any other relationships and classes that could be expected to be found in such a company. It should include any attributes and methods found in the problem description above.



- c) Draw a sequence diagram for the creation of a full service history. This should show how the information is obtained from the class diagram.

c)

Comments:

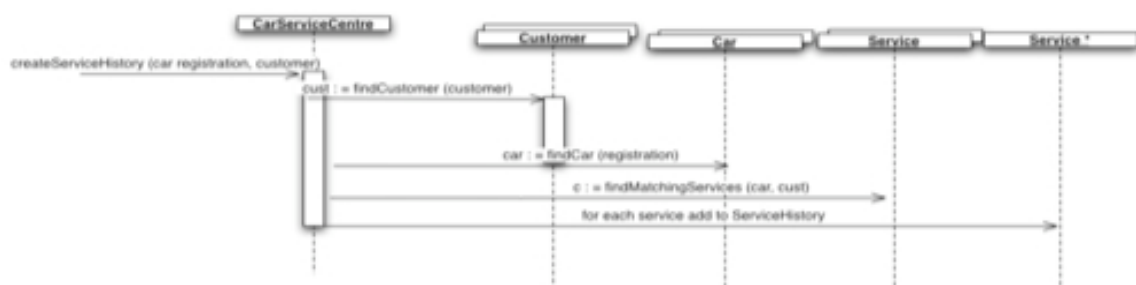
A car can be owned by more than one person in its history.

A customer can own more than one car.

We can't know when ownership moves from one person to another, so we have to track each Service with the customer who pays for it.

Orderline is required to store the quantities of parts (e.g. "4 spark plugs")

Total cost needs to be stored as the costs of parts can change over time (we can't recalculate it).



or something similar.

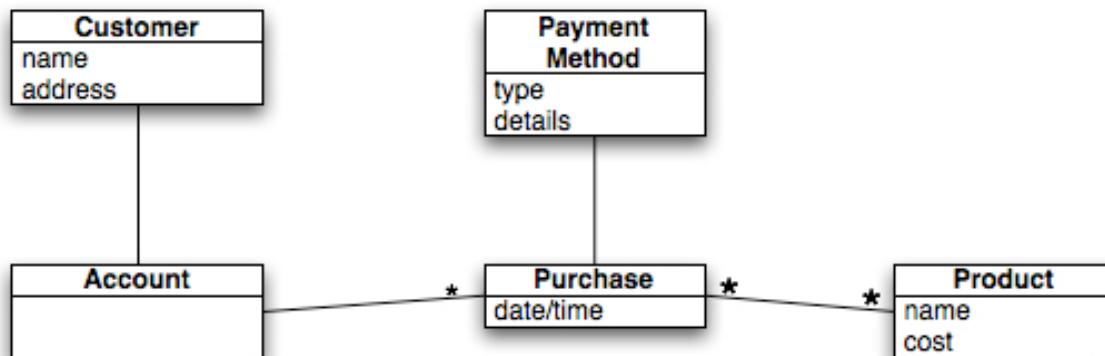
Need to have multiobjects to search through * associations, need loop to step through each service object.

QUESTION 2 (10 + 10 = 20 marks)

The following class diagram is designed to model purchases from an online store, but it is not quite correct. It should be able to model the following scenario, but can't.

- Modify the diagram so that it can handle this scenario.
- Draw an object diagram for the following scenario using the updated class diagram.

Peter enjoys buying bicycle equipment online. His previous purchase consisted of a bicycle chain, 2 tyres and a HID headlight. His friends were so impressed with his purchases that they asked him to place another order for 4 tyres, 2 HID headlights and a bell. These have yet to be delivered. He pays for his purchases using either PayPal or a credit card.



The problem with the diagram is that you can't record the quantity of an item bought. Also if you simply place "quantity" as an attribute inside product, you are requiring that the name be replicated across all purchases.

QUESTION 3 (10 marks)

A customer can place an order on Amazon that consists of multiple items. Initially a customer adds each item to a shopping cart. They can continue to shop for more items (or remove existing items), or check out their shopping cart. Once it has been checked out, the customer can either return to adding items, or place an order for the existing components. Up to this point the shopping cart can be cancelled. Once the order has been placed the customer can continue to add items to the order, but no longer cancel it. Once it has shipped you can no longer add new items to it or cancel the order.

Draw a state diagram for a customer's shopping experience.

QUESTION 4 (1 + 1 + 1 + 1 + 1 = 5 marks)

For each of the following software requirements, say whether or not it is a well written requirement. Justify each of your answer in 1-3 sentences.

- a) The system should not cause a train to run late by more than 1 minute.
- b) The source code should have sufficient comments to allow it to be easily understood.
- c) The car's braking system should cause it to stop within 10 seconds from the application of the brakes.
- d) Java should not be used in the software development.
- e) The application should be easily understood by new users.

Solutions:

- a) This is slightly tricky - and I'm prepared to accept either true or false, depending on how well it is argued. I would tend to say it's an ok requirement, as you could conceive of a system whose performance was such that it can always calculate whatever it does in less than a minute. On the other hand we are not sure of the extent of "the system".
- b) not well written. what does "easily understood" mean? we would need to specify who the target audience was
- c) not well written. How fast can the car be going? in what conditions – wet or dry? with what load in the car? is it towing anything etc.
- d) well written – this requirement is very easy to test for. some students will say it's a silly requirement because "java is a fantastic language!" which is totally irrelevant.
- e) Same problem as b.

QUESTION 5 (10 marks)

A team decided to develop software that would utilise a feature that Microsoft announced would be released within the year. Microsoft however failed to deliver the feature by the announcement date. After another 6 months details of the feature were removed from Microsoft's advertising, and after the team contacted Microsoft they found that the feature was indefinitely on hold, with no planned release date.

Discuss the concepts of Risk Mitigation, Contingency Planning and Transition Monitoring as it relates to the team in the context of this problem.

Solutions:

Risk mitigation is taking steps to reduce the impact of a risk should it occur.

First the risk should be identified. Here it is the risk that the product the company will waste its resources building something that won't work without Microsofts component. To mitigate against this they could

- design a replacement component themselves

- search for other companies who provide similar components

design their software so that the components can be easily replaced
not rely on the feature being there at all (ensuring the next release of the software
is still good enough for people to buy without that feature.

Contingency planning

What to do in case the problem does occur. In this case they could buy similar software
from other companies (if available) to place in their software, or ship the software
without the feature.

Transition monitoring

This is deciding when the risk of non delivery becomes reality. In this case there is no
single date apart from when Microsoft announces when the feature is on hold
indefinitely. this may be too late, so it would be wise for the company to specify an
earlier date when they decide microsoft is not going to deliver.

QUESTION 6 (10 marks)

A software company is contracted to update a bank's web based banking software. They
request advice from existing customers about features they would like. To do this they
create a program that presents an online form and saves the information to a database and
linking it to the existing website.

After a month the feedback is assessed and given to the bank to prioritize. The company
then puts forward a costed proposal for the changes that the bank accepts.

The company performs the first set of changes and releases them. Once the bank is
satisfied that it works correctly a second set of changes are approved, developed and
released.

For each of the activities mentioned above, describe where they fit into the Rational
Unified Process in terms of phases and increments.

You should write about 6 - 10 short sentences, each starting on a separate line

4 phase are

Inception

Elaboration

Construction

Transition

Inception

**Bank thinking about new features requests company to work on it & get
more information.**

**You can view creation of the form as more in the inception phase, or as a separate
increment in which a program is created.**

The data is analysed and priorities are assigned for the main features.

Elaboration

The company examines how much each feature is going to create and costs it.

This is put to the bank and approved.

Construction

The program is created

Transition

The program is released and the bank evaluates it.

Increment #1

Inception

The new round of changes is approved. This section is a formality

Elaboration

Etc.

Increment #2